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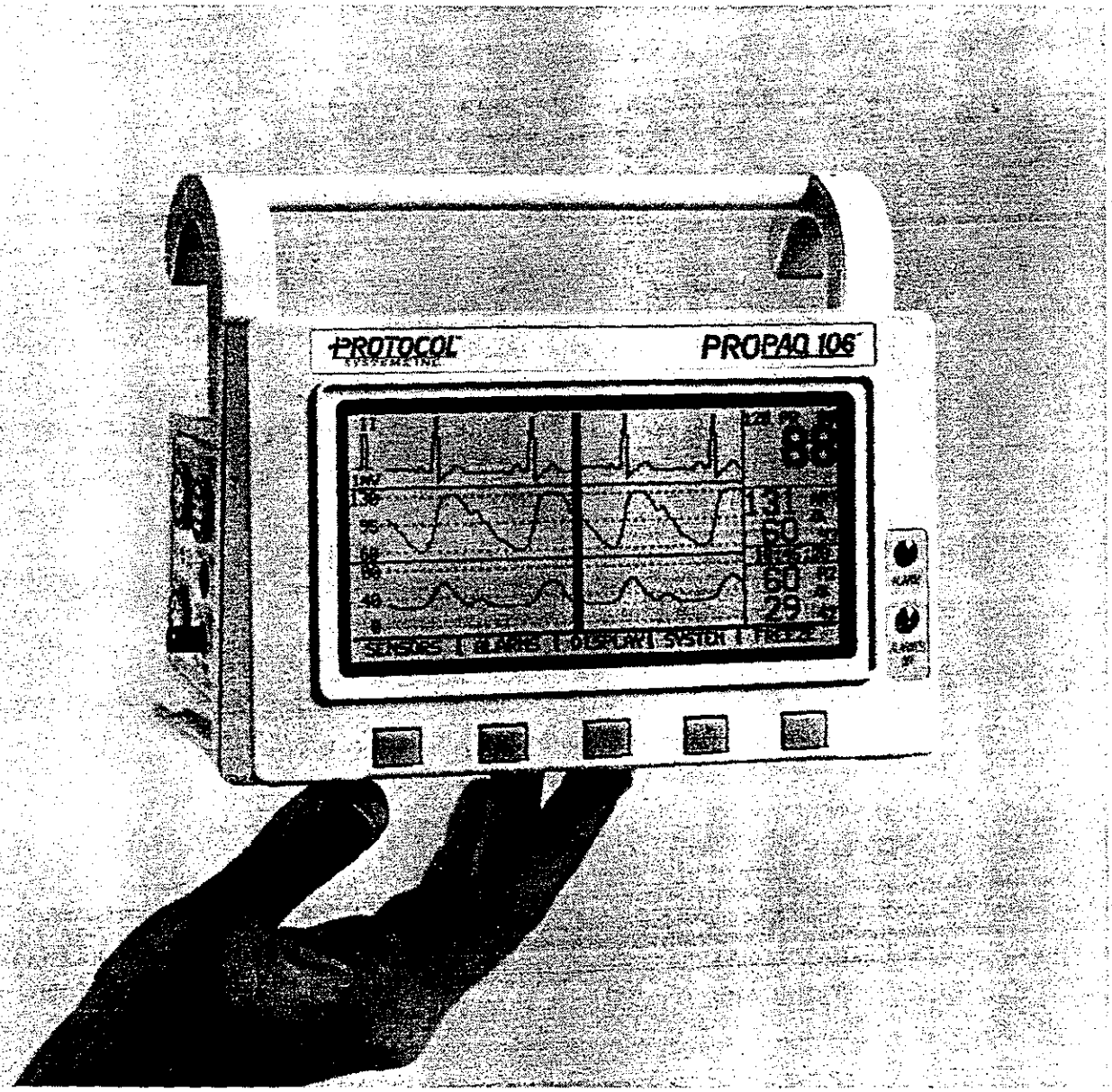


The Protocol Systems Propaq series of monitors is lightweight, compact, yet full-featured enough for many monitoring applications. The Propaq is manufactured by Protocol Systems, Inc. of Beaverton, Oregon, U.S.A.

General Information

Propaq Models

Propaq monitors (opposite page) are durable, lightweight, portable patient monitors for use in many monitoring applications:

- pre-hospital care/transport
- intra-hospital patient transport
- post-anesthesia monitoring
- outpatient and low-risk surgical procedures
- emergency medical service
- monitoring during and after special procedures such as endoscopy and catheterization, where critically ill patients require continuous monitoring
- step-down care
- field hospital use

Three models of Propaq monitors provide the monitoring needs required for high-quality patient care, including ECG, noninvasive blood pressure, invasive pressure, temperature, and pulse oximetry.

Weighing as little as six pounds, the Propaq can easily be carried, or it can be hung on a gurney rail for patient transport. Extremely low-power operation allows the Propaq to operate for up to 30 hours on one battery charge.

Vital Sign Parameter	102	104	106
ECG	1 Chan.: 3-Lead	1 Chan.: 3-Lead	1 Chan.: 3-Lead
Noninvasive Blood Pressure	1 Channel	1 Channel	1 Channel
Invasive Pressure	None	1 Channel	2 Channels
Temperature	2 Chan.: YSI® & Electromedics®	2 Chan.: YSI® & Electromedics®	1 Channel: YSI®
NELLCOR-compatible Pulse Oximetry	Optional	Optional	Optional
Printer	Optional	Optional	Optional
Low-power EL Display	Optional	Optional	Optional

For fixed-site operation and recharging from ac mains, a small ac power adapter plugs into the monitor. Only a Protocol Systems *ac power adapter* should be used to insure protection against leakage current hazards. See *Battery Operation* later in this section. The Propaq can also be powered and recharged from a 10-32 volt dc source, making it ideal for emergency vehicle or field medical applications.

Protocol Systems provides many necessary accessories for patient monitoring including three-lead ECG cables and various sizes of blood pressure cuffs for the Propaq. The monitor is also compatible with popular Yellow Springs Instrument Company (YSI®) and Electromedics® temperature probes. Propaq invasive blood pressure channels require 5 μV/V/mmHg strain-gauge transducers.

Other accessories are also available. See Appendix C for a list of accessories and information on ordering.

Propaq Capabilities

Although complete operating specifications are provided in Appendix B, the following information identifies many of the Propaq's monitoring features and benefits.

Alarms

- **Upper and lower alarm limits.**
- **Automatic and manual** alarm limit settings.
- **Immediate silencing** of alarms.
- **Temporary suspension** of alarm tone.
- **Equipment alarm** for indication of incorrect monitoring conditions.
- **Visual indication if alarms are off.**

ECG Channel

- **Three leads** for the most widely used ECG monitoring configurations.
- **12.5, 25, or 50 mm/second** selectable sweep speeds.
- **0.2, 0.5, 1, 2, and 4 mV/cm** waveform display amplitudes.
- **Pacer spike display** for quick recognition of pacer occurrences.

Invasive Pressure Channels (Models 104 & 106 Only)

- **P1-One pressure (104) or P1/P2-two pressures (106).**
- **Monitors arterial, venous, and intracranial pressures.**
- **Can simultaneously display two pressures (model 106 only).**
- **Two blood pressure display modes.**
- **Selectable labels** for quick source identification.
- **Large blood pressure values** for easy reading.

- **Compatible with disposable and reusable blood pressure transducers.**

CUFF Channel (Noninvasive Blood Pressure)

- **Several cuff sizes** for varying applications.
- **Automatic blood pressure readings** initiated at user-selected intervals of 1, 2, 3, 5, 10, 15, 30, or 60 minutes.
- **Turbocuff mode** for maximum number of consecutive CUFF readings in five minutes.
- **Manometer displayed** with CUFF Menu.
- **Easily initiated** blood pressure measurements.
- **Pulse rate determined from cuff pulsations.**

Temperature Channels

- **Two temperature channels:** T1 and T2 (T1 only on model 106).
- **T1, T2 and difference temperature** (ΔT) displayed.

Pulse Oximetry (SpO_2)

- **Matches performance of NELLCOR N-200®** Pulse Oximeter.
- **Displays both** SpO_2 plethysmograph waveform and oxygen saturation numeric.
- **Pulse amplitude indicator** shows blood pulse activity.
- **Pulse plethysmograph waveform** indicates signal strength and volume change.
- **Allows connection of NELLCOR Patient Cable or NELLCOR oxygen sensor only** (without Patient Cable).
- **Uses a wide range of popular NELLCOR oxygen sensors.**

Trends

- **Five hours** of displayed data.
- **Two minute resolution.**

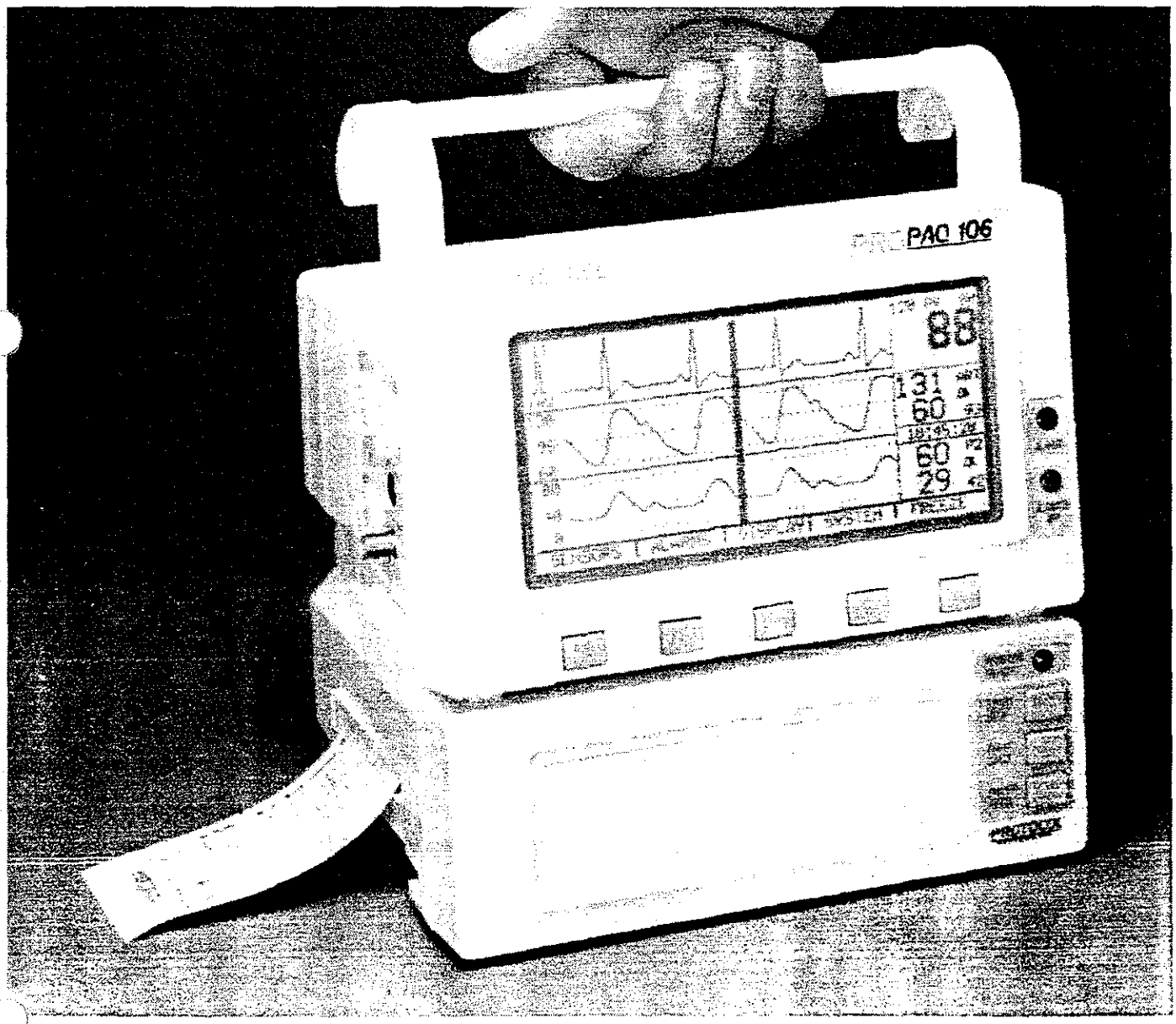
- **Graphical and tabular formats.**
- **Selectable display scales.**
- **Automatic trending** available.

General

- **FREEZE** all waveforms for analysis.
- **Selectable heart rate source** from ECG, invasive blood pressure(s), or SpO_2.
- **In-service mode** allows quick, friendly training of new users with working controls and simulated patient data.
- **Optional printer** documents up to 3 waveforms, all numerics, and trends with automatic and manual printing.

Propaq Expansion Module With Printer

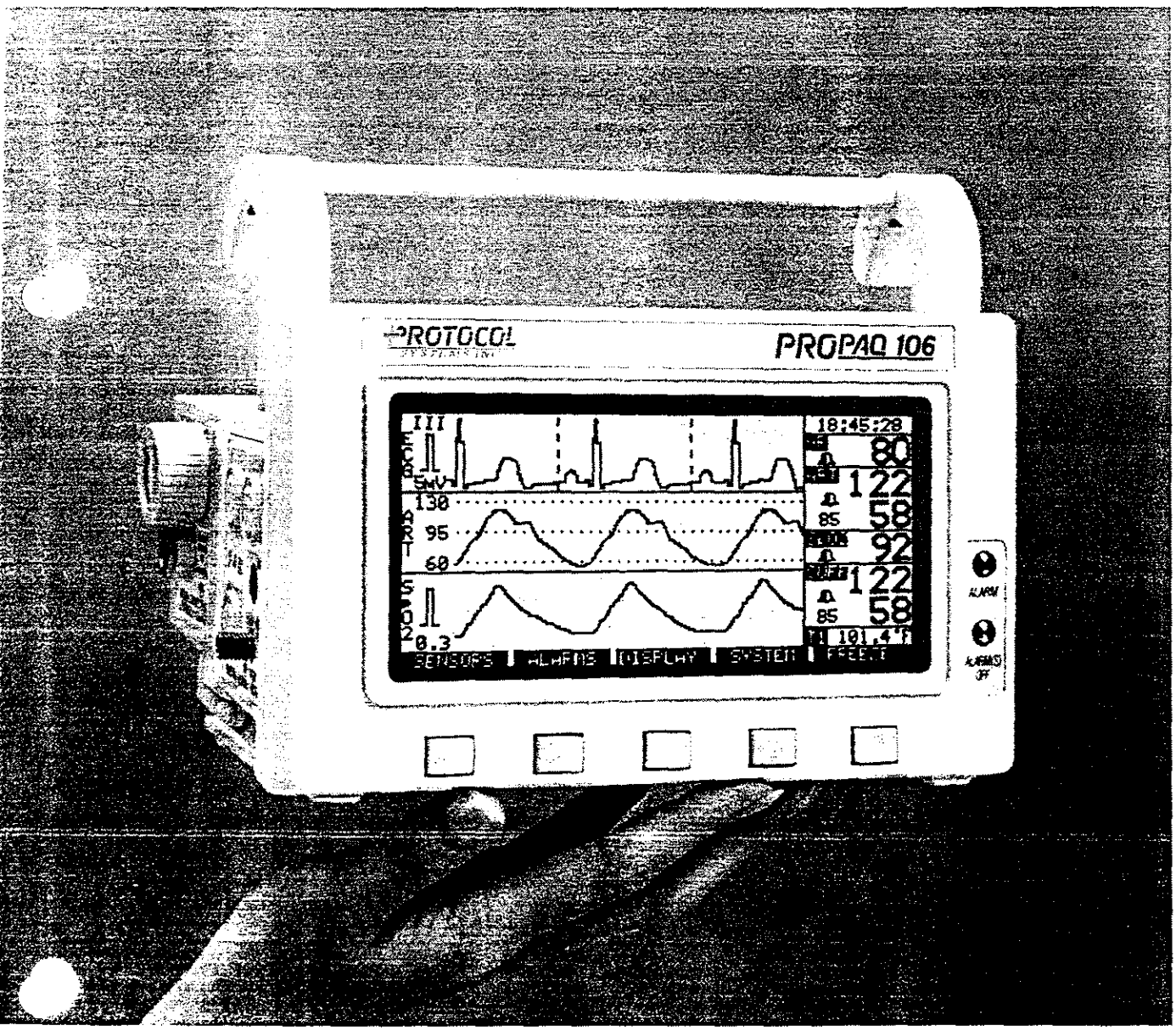
The Propaq Expansion Module (shown below) attaches to the Propaq monitor. This lightweight addition allows expanded monitoring capabilities to be added to the Propaq either at the time the Expansion Module is purchased and installed or at a later date when monitoring needs are increased. The Expansion Module can house a three waveform printer (Propaq Printer) and a NELLCOR-compatible pulse oximetry (SpO_2) option.



The Propaq Expansion Module with Printer provides monitor function expansion and patient data printing.

?ropaq Pulse Oximetry Option (SpO_2)

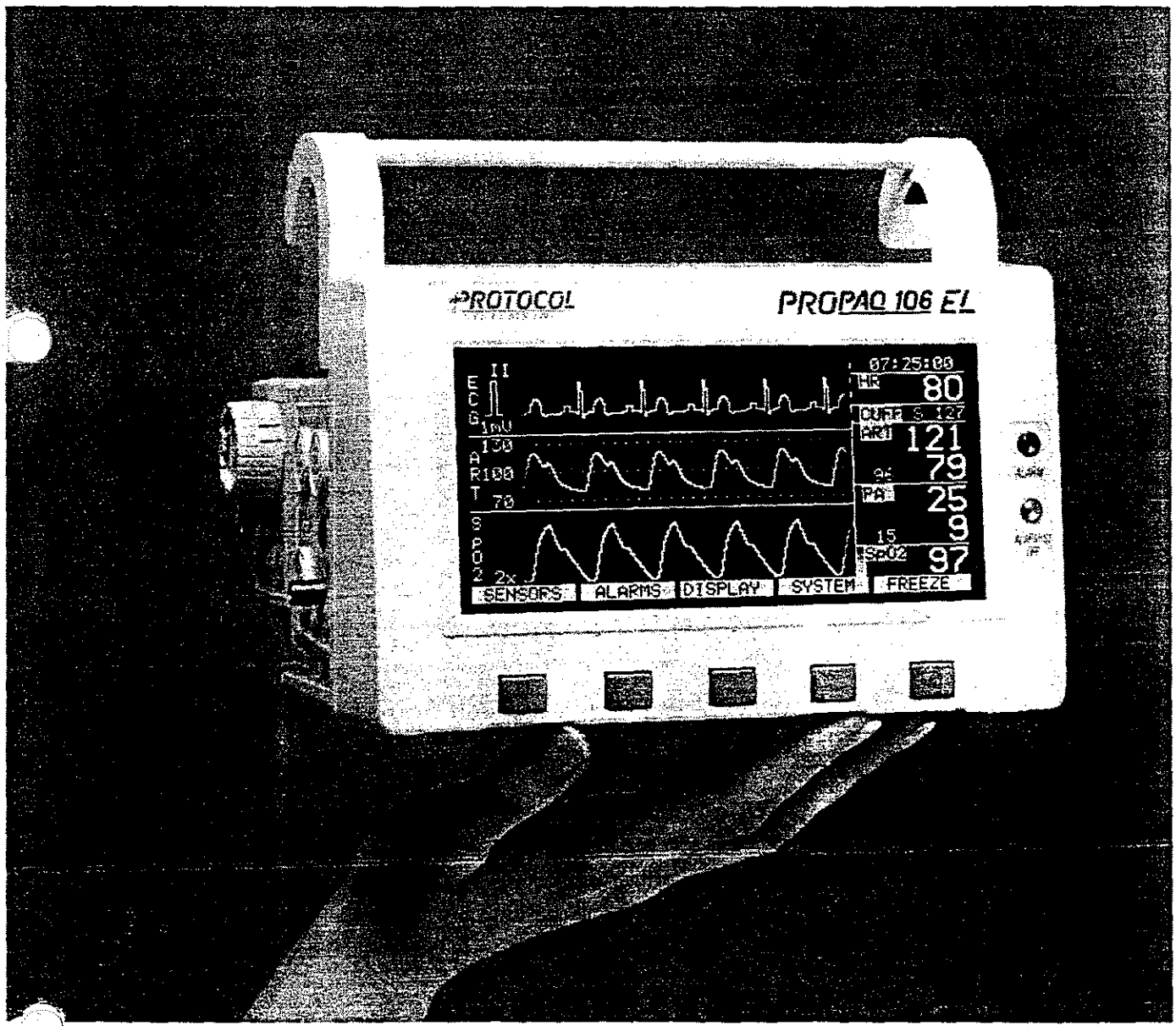
The Propaq Pulse Oximetry option (designated SpO_2) can be installed in the Expansion Module or added to any Propaq monitor as an option that attaches to the rear of the monitor (shown below). The SpO_2 option was designed to match the performance of a NELLCOR N-200 Pulse Oximeter. This device can be used only with NELLCOR oxygen transducers. For further information on Pulse Oximetry, read the *Pulse Oximetry Monitoring* information in Chapter 2.



The Propaq Pulse Oximetry option adds to the Propaq the ability to noninvasively monitor functional arteriolar oxygen saturation. This option expands the Propaq's monitoring abilities with very little weight addition.

L Display

The Propaq EL Display is excellent for bedside applications where viewing the Propaq display from a longer distance is required. The EL display increases both the contrast and viewing angle of the monitor. All other features of the Propaq remain the same.



Propaq EL Display Option adds bedside use of the Propaq monitors to its extensive features used in patient transport.

ropaq Warranty

This product is sold by Protocol Systems, Inc. under the warranties set forth in the following paragraphs. Such warranties are extended only with respect to the purchase of this product directly from Protocol or Protocol's Authorized Distributors as new merchandise and are extended to the first buyer thereof, other than for resale.

For a period of twelve (12) months from the date of original delivery to Buyer (end user), this product is warranted to be free from functional defects in materials and workmanship and to conform to the description of the product contained in the *User's Guide* and *Technical Reference Guide* and accompanying labels and/or inserts, provided that the same is properly operated under conditions of normal use in accordance with applicable safety and regulatory requirements, and that replacements and repairs are made in accordance with the instructions provided by Protocol.

This same warranty is made for a period of ninety (90) days with respect to accessories provided by Protocol as a part of the original equipment purchase. Warranty of accessories purchased separately from listed suppliers will be the responsibility of such listed suppliers.

The foregoing warranties shall not apply if the product has been configured, modified, adjusted, or repaired other than by Protocol or by persons expressly authorized by Protocol, or not in accordance with written instructions provided by Protocol, or if the product has been subject to misuse, negligence or accident.

CONTINUED ON THE NEXT PAGE

Protocol's sole and exclusive obligation and Buyer's sole and exclusive remedy under the above warranties, is limited to repairing or replacing, free of charge, a product which is telephonically reported to Protocol, has a Returned Material Authorization number assigned and which is returned, not later than seven (7) days after the expiration of the warranty, to:

Protocol Systems, Inc.
8500 SW Creekside Place
Beaverton, OR 97005 USA
Telephone: (503) 526-8500
Facsimile: (503) 526-4200

during normal business hours, transporting charges prepaid and which, upon Protocol's examination, is found not to conform with the above warranties. PROTOCOL SYSTEMS, INC. SHALL NOT BE OTHERWISE LIABLE FOR ANY DAMAGES INCLUDING, BUT NOT LIMITED TO, INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES OR SPECIAL DAMAGES.

THERE ARE NO EXPRESS OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREINABOVE SET FORTH. PROTOCOL MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT OR PARTS THEREOF.

Getting to Know Your Propaq

This section, and the rest in this chapter, help you become more familiar with the Propaq. The more you know about it, the more effectively you can use the monitor to provide the high-quality patient care you strive for.

This section, beginning on the next page, briefly describes the Propaq's external controls, indicators, and connectors, shows you where information is displayed on the Propaq, and introduces you to the Propaq's menus. The accompanying figures provide a reference for you so you don't need the monitor while reading the information.

System Controls

Refer to the figure on the next page.

Defib Sync/Delayed Analog

With the proper Analog Output cable available from Protocol Systems, DEFIB SYNC, ECG, and invasive pressure signals can be sent to external devices, such as a strip-chart recorder or defibrillator. See Appendix B, Specifications, for more information. Safe interconnection between the Propaq and another device must be in accordance with AAMI recommendations.

POWER INPUT Connector

This receptacle accepts Protocol Systems' 503-0002-XX ac power adapter, which *must* be used for ac mains operation and battery charging. The receptacle is also compatible with other 10-32 volt, dc-only power sources, such as a vehicle battery system.

The North American ac power adapter can be used with 50 and 60 Hz mains from 100 to 120 vac. International power adapters are available.

BATTERY CHARGING Light

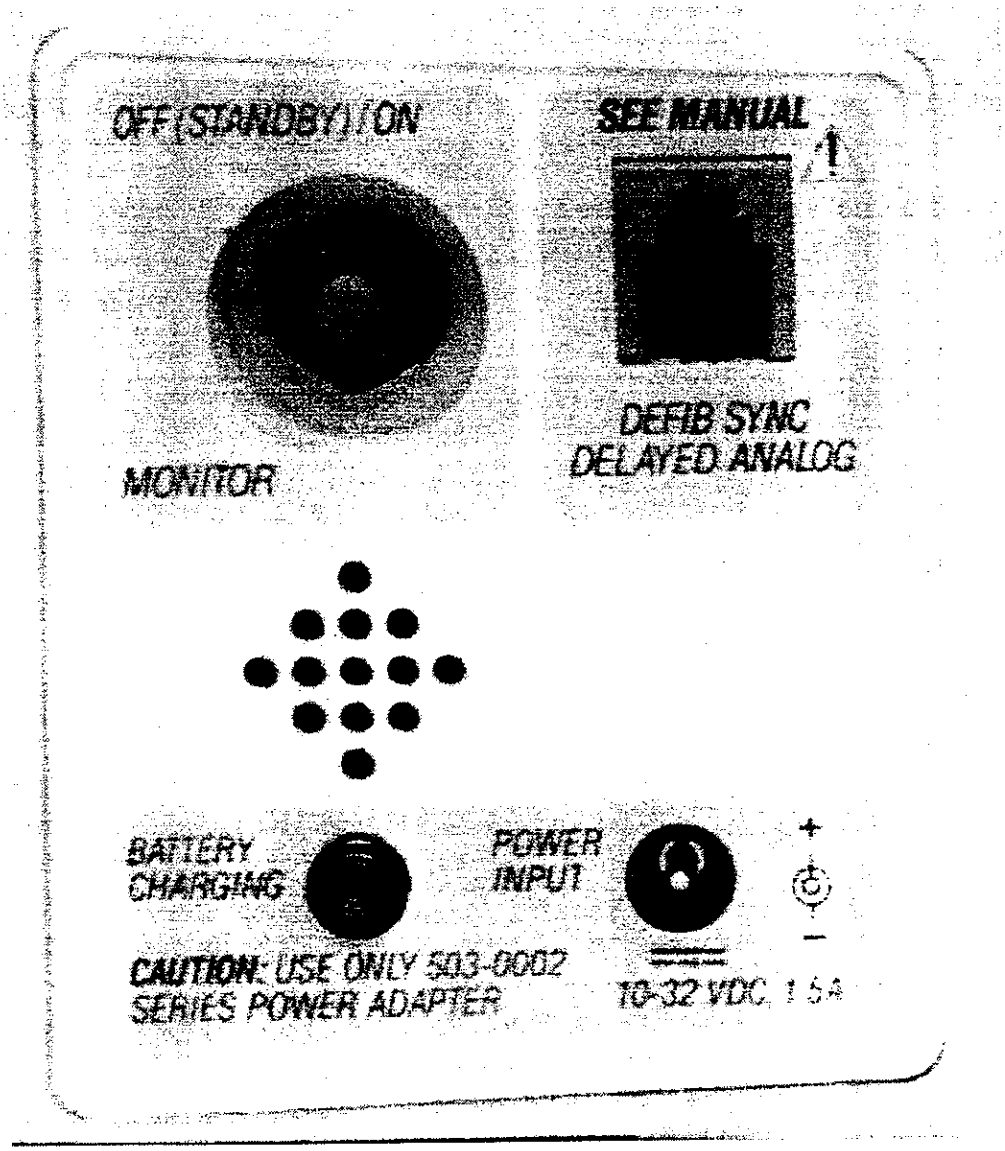
This green light turns on when a power source (ac power adapter or external dc source) is connected and the battery is charging. Although the monitor may be turned off, battery charging continues when an external power source is connected.

OFF (STANDBY)/ON Switch

Turns monitor on and off. The switch is recessed to prevent accidental turn-off of the monitor, which would result in losing patient data.

When you first turn on the monitor, information about the Propaq is shown on the screen. This is the *startup window*. While the startup window is displayed, the monitor checks its own electronics to be sure they properly function.

If the monitor detects a problem in its electronics, an error message window appears containing an error number and what to do. Report such errors to Protocol Systems.



The right side panel system controls are sealed in a water resistant panel that keeps moisture out of the Propaq's interior electronics.

ttery Operation

The Propaq's design is greatly enhanced by its ability to operate for extended periods from an internal battery. This makes the Propaq ideal for patient transport and field medical use.

It is recommended that you operate the monitor from the battery if the mains ground (earth) conductor is suspect.

The battery can operate the Propaq from 6 to 30 hours. The actual operating time depends on several factors, but mostly on how often you take noninvasive blood pressure measurements (CUFF) and, for the LCD version, whether the backlight is continuously turned on or placed in the **3 Min. Reset** mode of operation.

In applications where the monitor must operate for extended periods from its battery, set the backlight operating mode to **3 Min. Reset** (LCD versions only) and limit the number of cuff measurements you take.

To the Propaq, its battery voltage is a critical operating factor. The monitor's ultrasmart capabilities let you know when its battery voltage begins to get low. When the battery voltage is too low to successfully take cuff measurements, the Propaq turns off the cuff channel and lets you know the cuff channel is no longer available.

The lifetime usage of the battery (battery life) may be shortened if the battery is not cared for properly. For prolonged storage of the Propaq, you should remove the battery. Battery life may be prolonged by following a few simple guidelines:

- Keep the ac power adapter plugged into the monitor and an ac mains source whenever possible and when not in use.
- If the LOW BATT message appears, connect the charger as soon as possible.
- Use the 3 Min. Reset backlight mode (explained later in this chapter) whenever possible.

More information on battery operation and storage can be found in Chapter 5.

A n Lights

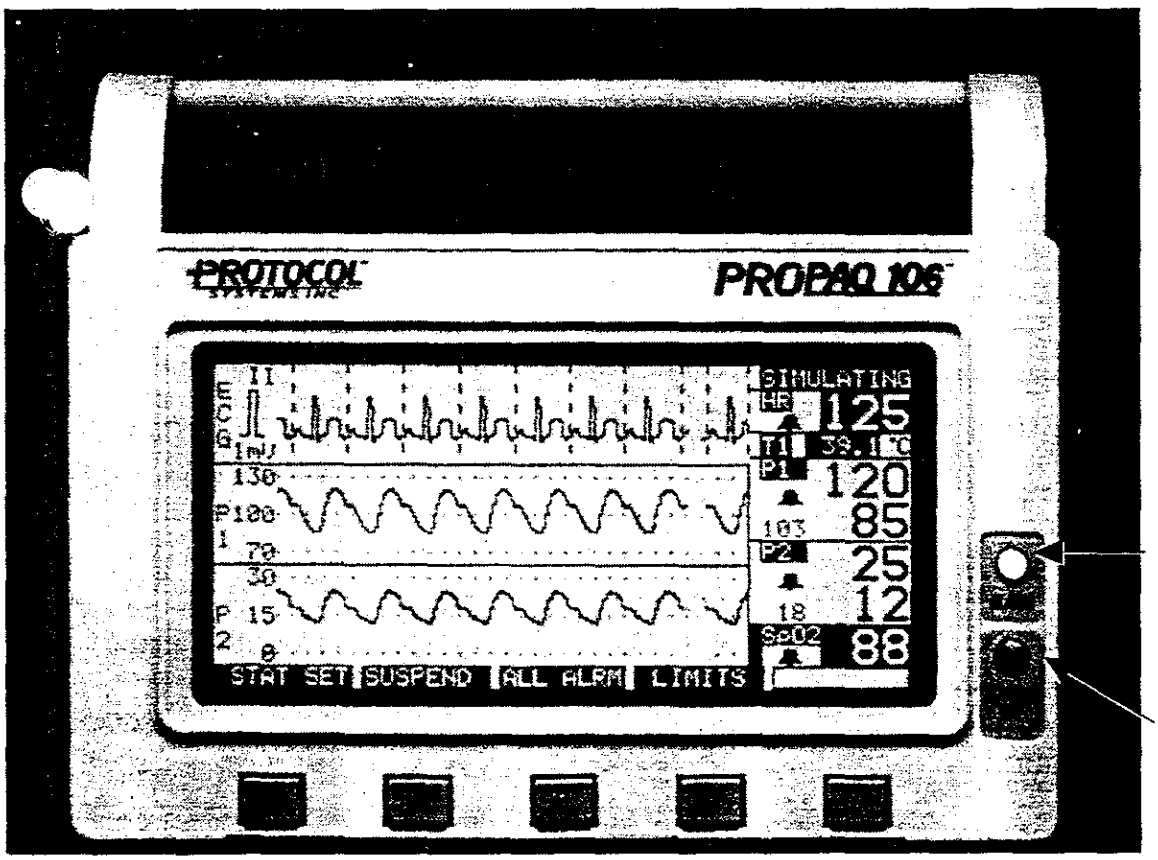
Alarms and limits are thoroughly described in Chapter 3.

ALARM Light

When an alarm limit is violated, the *ALARM* light turns on and an alarm tone sounds. The *ALARM* light can also indicate other alarm conditions. Refer to Chapter 3 for more information.

ALARM(S) OFF Light

When *any* alarm limit is turned off, the *ALARM(S) OFF* light turns on. The *ALARM(S) OFF* light can also indicate other alarm conditions. Refer to Chapter 3 for more information.



ALARM—indicates different alarm conditions.

ALARM(S) OFF—indicates any alarm is turned off.

The Propaq's alarm system always notifies the user of the alarm status with alarm lights on the front panel and bell symbols in the numerics display areas.

Patient Connections

Patient connections and monitoring with the Propaq *patient channels* are thoroughly described in Chapter 2. Refer to the figures on the following page. Accessories available from Protocol Systems, and other manufacturer's accessories that can be used with the Propaq, are listed in Appendix C.

***Patient Channel**—the physical connection between the Propaq and the patient. ECG, P1, P2, T1, T2, and SpO_2 are patient channels.*

ECG Connector

The ECG connector is a 6-pin connector that conforms to the standard for ECG monitors suggested by the Association for the Advancement of Medical Instrumentation (AAMI). Only ECG cables meeting Protocol Systems specifications and conforming to the AAMI standard should be used with the Propaq. The ECG channel provides 3-lead monitoring and is protected against damage from defibrillator discharge and electrosurgical machines, however the Propaq ECG channel does not contain electrosurgical interference suppression (ESIS).

CUFF Connector

The Propaq uses a single-hose cuff available from Protocol Systems in several sizes for different applications. The cuff is easily connected and disconnected from the screw-on connector. Only cuffs recommended or supplied by Protocol Systems should be used.

Temperature Connectors

The temperature connectors are compatible with Yellow Springs Instrument Company (YSI) Models 400 and 700, and Electromedics Models 2100, 2400, and 2700 temperature probes.

Invasive Pressure Connector(s) (Models 104 and 106 only)

The invasive pressure connector is a 6-pin connector compatible with the ITT®-Cannon® plug MS3106F-14S-6P. The invasive pressure channels require transducers with 5 µV/V/mmHg sensitivity. See the accessories listing in Appendix C for a list of compatible transducers.

Pulse Oximetry (SpO_2) Option

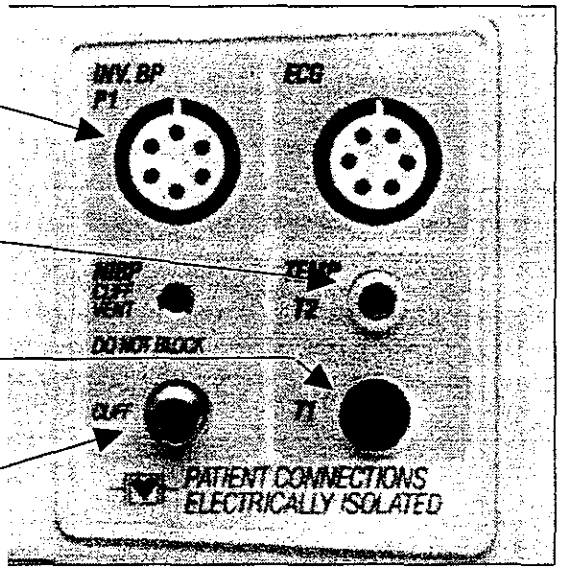
The SpO_2 option includes two connectors. The NELLCOR Patient Module Cable, commonly used with the NELLCOR N-200 Pulse Oximeter, can be connected to the round connector. Alternatively, the NELLCOR oxygen sensor or a sensor extender cable can be directly connected to the D-type connector.

ıe Propaq 102 ›es not have this ›nnector.

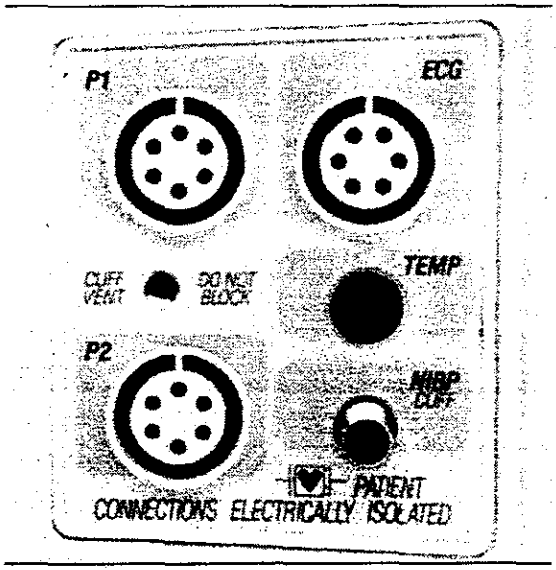
lectromedics ɜmp connector

SI Temperature ›nnector

uff Hose Fitting



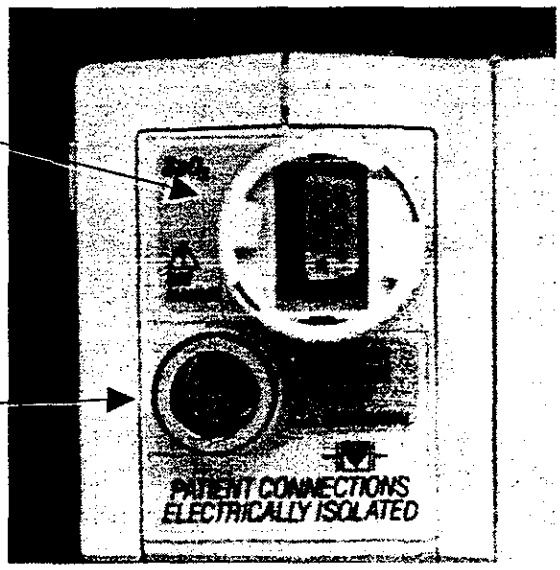
Propaq 104 allows monitoring of ECG, 1 invasive pressure, noninvasive pressure (CUFF) and two temperatures. The Propaq 102 does not have invasive pressure monitoring capability.



Propaq 106 allows monitoring of ECG, 2 invasive pressures, noninvasive blood pressure (CUFF) and temperature.

irectly connect ygen sensor ere.

onnect NELLCOR at Cable here.



The Pulse Oximetry option allows use of the NELLCOR Patient Cable or direct connection of the sensor.

Propaq Display

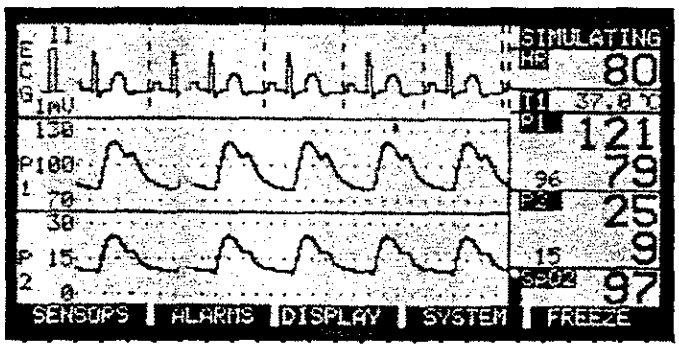
The Propaq comes standard with a Liquid Crystal Display screen (LCD). An optional electroluminescence (EL) display screen is available.

The display shows waveforms, vital sign numeric values, Propaq status, and alarm information in different *windows*. Different vital sign numeric values (such as heart rate and blood pressures) have upper and lower range limits. If the Propaq detects a vital sign value outside of the Propaq's measurable range, the monitor displays --- (below the range) or +++ (above the range) instead of the vital sign value. For example, the heart rate counter range is 25 to 250 beats per minute (bpm). A heart rate above 250 bpm appears as +++.

***Window**—an area on the Propaq display used to show information, such as status, wave forms, numerics, alarms, etc.*

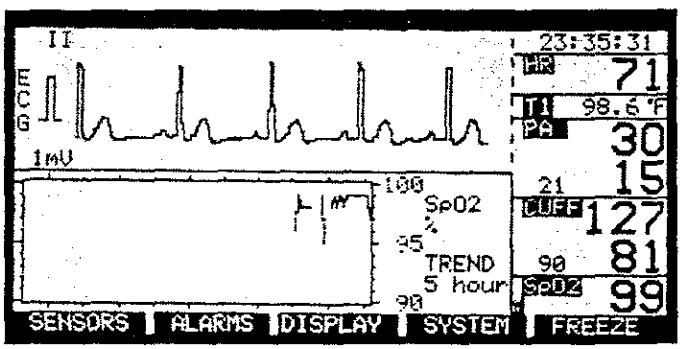
Waveform/Status Window

When there is waveform information to display, up to three waveforms can be shown. You can also have just two waveforms displayed (dividing the display into two waveform windows) or just one waveform (dividing the display into a waveform window and a *status window*—opposite page).



With a full-featured Propaq, such as a 106, three waveforms can be shown along with important numeric values.

With all Propaqs, a patient waveform and trend information can be simultaneously displayed, while important numeric values are continuously updated.

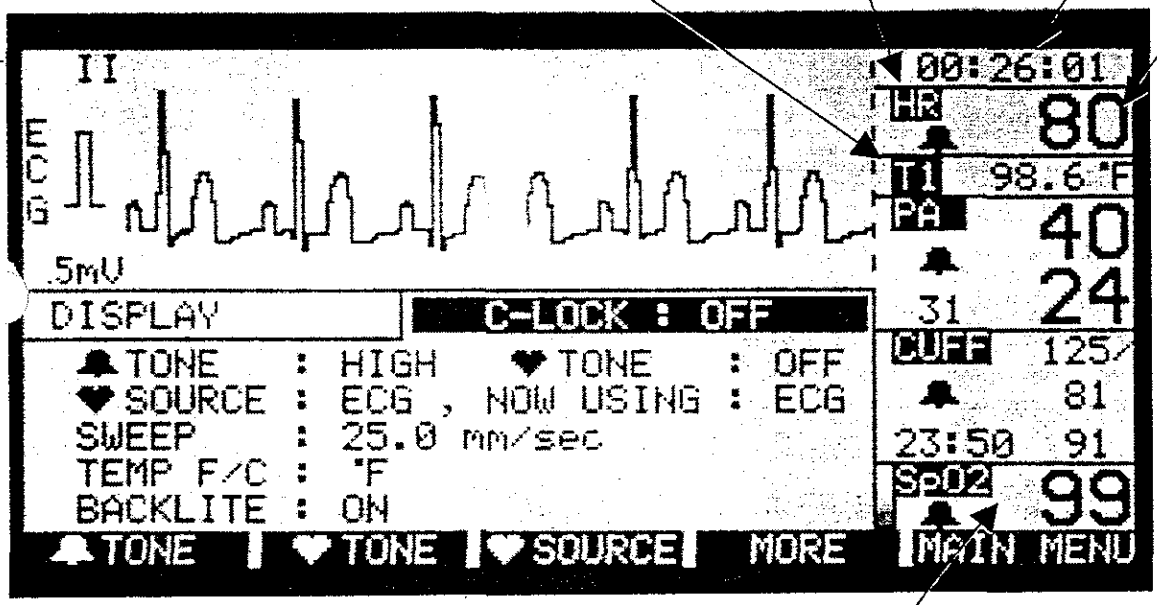


If more than one temperature is monitored, each temperature value is displayed for a short time before the next one appears. Cuff pressure values appear here when both Blood Pressure Numerics windows are occupied.

Time of day alternates with a message when an equipment condition needing attention exists.

Heart Rate Source

Heart Rate



Oxygen saturation is a percentage value and appears only if the option is installed and it is monitored.

Blood pressure values can display invasive or noninvasive pressures. Invasive pressures always have priority in these windows.

typical Propaq LCD display may look like this one. The status window shows the current splay settings for the LCD Propaq. EL Display Propaqs do not have a backlight and would not show this setting.

Waveforms can be unfrozen or frozen. Waveforms that are unfrozen always show the latest information about the patient being monitored. These waveforms are continuously updated from left to right, with an invisible erase bar showing the separation between the oldest and newest information. When you freeze a waveform, the Propaq continues to monitor the patient, watching for alarm conditions, so that the patient is continuously monitored whether or not the waveforms are frozen. If only one or two waveforms are displayed and you freeze the display, the frozen waveform(s) are shown along with an unfrozen waveform so you can continue to monitor the patient's waveform.

When a status window appears in the lower half of the display, information about a selected monitoring function is shown. Although some waveforms are not displayed during this time, ECG (if it is monitored) is always displayed, and the monitor continues to update and display the heart rate, pressure values, and other numerics so that you can always see the patient's current condition. When the status window is removed, the prior waveform(s) reappear.

Heart Rate Source

Heart rate can be derived from ECG, invasive pressure, pulse oximetry, or noninvasive pressure. The letters HR (heart rate) in this area indicate a rate from ECG (an *electrical heart signal*); the letters PR (pulse rate) in this area indicate a rate derived from *blood pulsing* through the circulatory system, such as from a pressure source or from SpO_2.

When the Propaq is turned on, it automatically selects the first available patient channel as the rate source according to these priorities: ECG (first choice), P1 (second choice), SpO_2 (third choice, if present), P2 (fourth choice, 106 only); and CUFF (only when all of the previous sources are unavailable).

The heart rate source can be changed using the Display Menu (described later in this section in *Propaq Menus*). CUFF, however, cannot manually be selected as a heart rate source.

Heart Rate

The heart rate is determined from the selected heart rate source. Rate is determined by counting the number of QRS events or blood pulses over a period of time and converting the value to beats per minute (bpm). The Propaq can count from 25 to 250 (bpm).

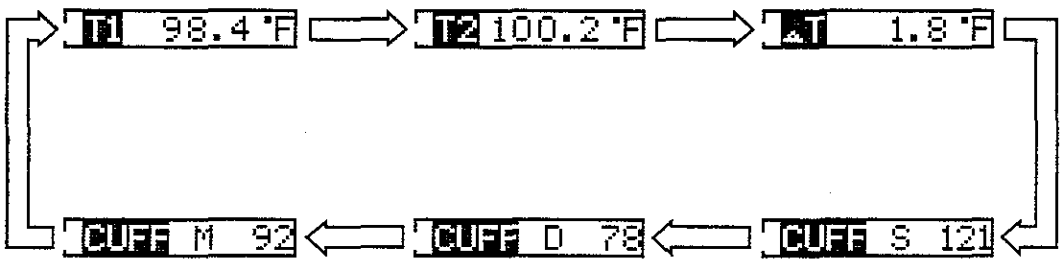
Blood Pressure Numerics

There are two blood pressure numerics windows. If invasive pressure is monitored (arterial or venous), the measurements will appear in the upper window for P1 and the lower window for P2 (106 only). If only one invasive pressure is monitored, the noninvasive pressure measurements (if CUFF is monitored) will appear in the window not being used. If both invasive pressures and cuff are used, the invasive pressure numerics appear in their respective windows, and the cuff measurements appear in the Temperature Numerics window (see below). The Propaq can display invasive pressures from -30 to 300 mmHg. The Propaq can display cuff measurements in the ranges of 30 to 250 mmHg (systolic), 20 to 230 mmHg (diastolic), and 25 to 240 mmHg (mean).

Temperature Numerics Window

If temperature is monitored, the temperature numerics appear below the heart rate. If two temperatures are monitored, each temperature value (T1, T2, and ΔT) is displayed for a short time, circulating through all of the temperature measurements every few seconds. Temperature can be shown in either Fahrenheit or Celsius. You can change the units using the Display Menu described later in this section. The Propaq can display temperature values from 17° to 50° Celsius (62.6° to 122° Fahrenheit).

If both invasive pressures are used, the noninvasive pressure measurements (if monitored) also appear in this window, circulating with the temperature measurements as shown in the illustration below.



Temperature and cuff numerics circulate from one to the next, one per second.

Oxygen Saturation (SpO_2) Numerics

The SpO_2 value represents a percentage of oxygen saturation monitored by the Pulse Oximetry option. Values appear here only if the option is installed. The vertical bar next to the numeric indicates blood pulse activity.

Time of Day/Caution Messages

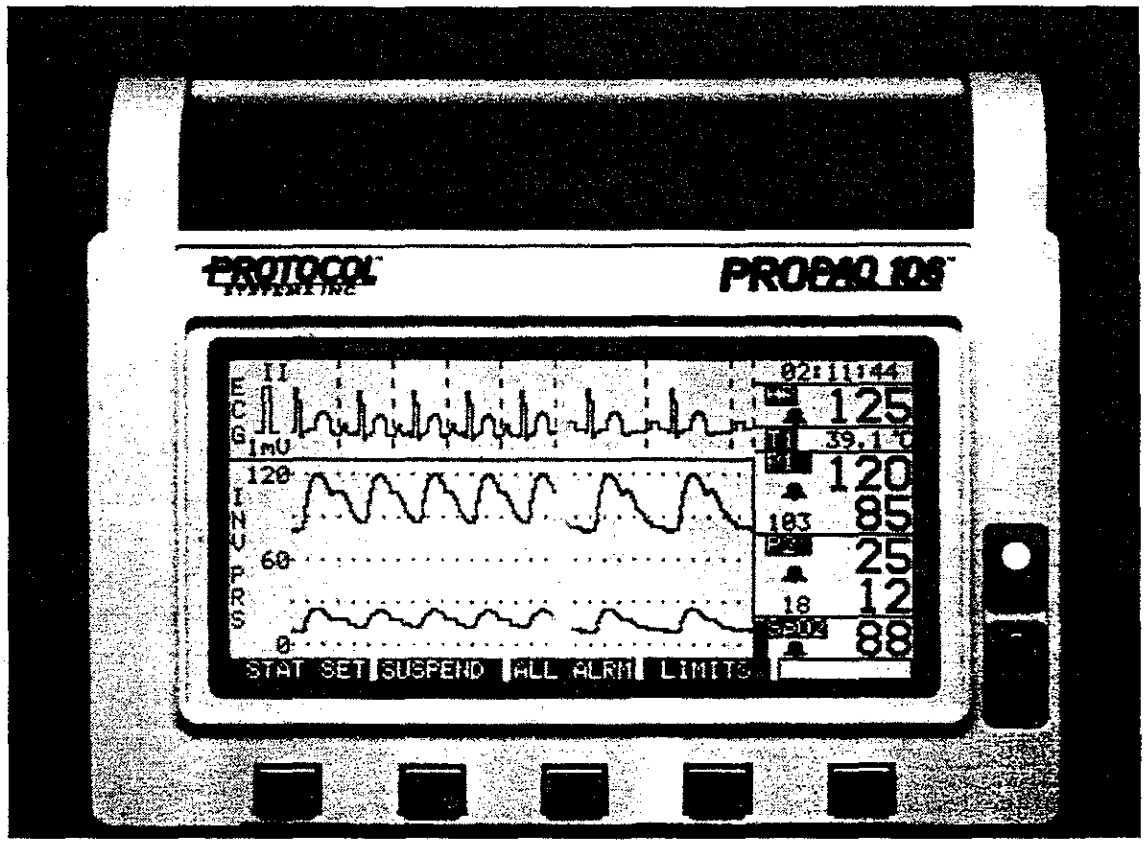
The time of day appears in a twenty-four hour clock format with 00:00:00 being midnight and 12:00:00 being noon. The clock is set using the System Menu described later in this section.

The Propaq's ultrasmart capabilities let you know when it has detected a condition affecting its ability to accurately monitor patients. When such a condition exists, a message alternates with the time of day. The following table lists possible messages, the conditions that cause them, and possible corrections.

...sage	Condition	Possible Correction
LOW BATT	Low battery voltage	Plug the Propaq into ac mains using the power adapter to recharge the battery
ECG FAULT	Faulty ECG lead connections	Check all ECG lead wires, electrodes, and cable.
P1 (or P2) FAULT	Faulty P1 (or P2) pressure transducer or connector	Check the transducer, application, and transducer cable. Rezero transducer if necessary.
T1 (or T2) FAULT	Shorted T1 (or T2) probe, or temperature is out of range	Check the probe, application, and cable.
CUFF FAULT	Various possible cuff problems. See Cuff Monitoring in Chapter 2.	
PRNT FAULT	Problem with the printer	Check the printer paper, paper door, and general functionality of printer.
SpO2 SRCH	SpO_2 does not detect pulses	Check oxygen sensor, application, and cable(s). Change sensor if necessary.
NO C-LOCK	SpO_2 is active with C-LOCK function turned ON, but a QRS event cannot be detected.	Check all ECG lead wires, electrodes and cable.
SIMULATING	INSERV mode is activated; simulated patient data is being displayed and saved in trend memory.	To deactivate, turn Propaq off and then on. See **Practicing With Your Propaq** later in this section.

Pushbuttons

Except for the Off/On switch, the pushbuttons are the only operator controls you use to control the Propaq. What each button does is identified by a pushbutton *label* displayed above each of the buttons. The five labels above the buttons make up a *menu*. There are several menus, allowing only five buttons to perform many Propaq functions, which keeps the operation of the Propaq monitors simple and efficient. The Propaq menus are described later in this section.

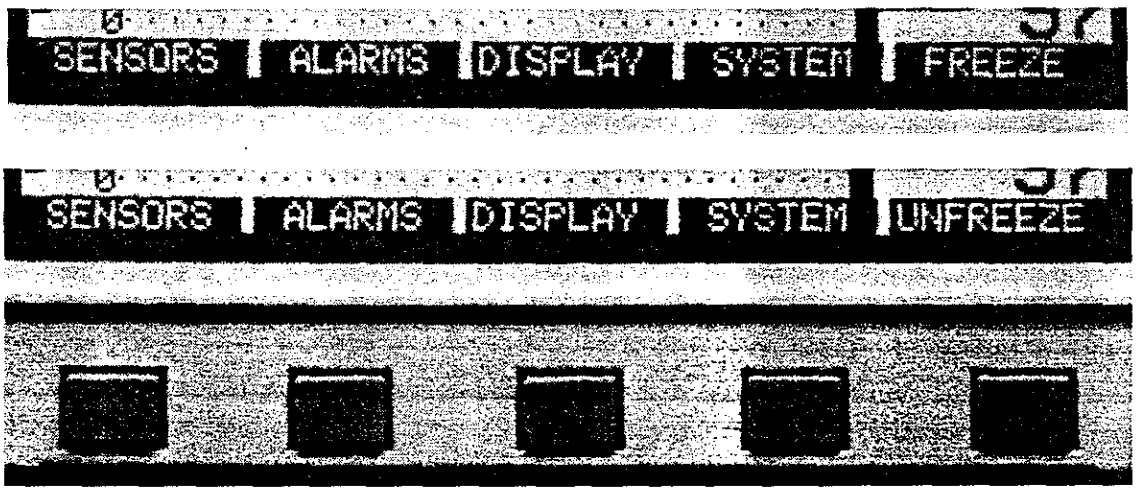


The Pushbuttons along the bottom of the Propaq are the only operator controls for interaction with the Propaq's monitoring abilities. The buttons allow you to select the many monitoring functions through use of the Propaq menus that appear on the display above the buttons.

Jsing the Propaq Menus

A menu in the Propaq is the row of labels displayed above the pushbuttons. Using the Propaq menus, you can control the Propaq with ease.

Some pushbutton labels indicate what the button will do when pressed. For example, pressing the FREEZE button will freeze waveforms. When this button is pressed, the FREEZE label changes to UNFREEZE. Pressing the UNFREEZE button, unfreezes waveforms, and the label changes back to FREEZE. The same pushbutton is used for both functions, allowing you to use only one button in a common position to perform two functions.



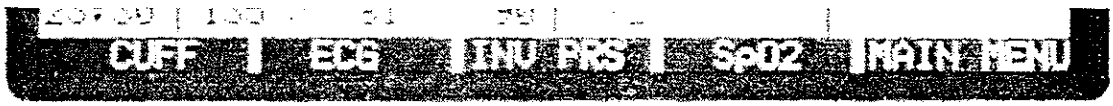
All Propaq buttons are labeled above the button. The label indicates the button's function. Some buttons, such as the FREEZE button, are designed to allow efficient operation by labeling one button with associated functions.

As you've seen, a single label may change to indicate an alternate function for the same pushbutton. However, pressing one pushbutton may instead change all the labels above the buttons. When this happens, an entirely new menu has appeared.

For example, when the SENSORS button is pressed, all the labels change to allow selections related to the Propaq's particular patient monitoring functions.

There are several different menus in the Propaq. How many functions in each Propaq model determines the number of menus for that particular model. There are menus for each patient channel in the Propaq (Sensors Menu), for the alarm system (Alarms Menu), for the display (Display Menu), and for other system functions, such as setting the time and date (System Menu). All menus are logically arranged so that with a few presses of the pushbuttons, the monitor is easily controlled.

Sensors Menu



Alarms Menu

Display Menu 1

System Menu 1

Propaq menus are designed for efficient use. All associated functions appear in easily accessible menus.

The Propaq Menus

Main Menu

The Main Menu is the first menu to appear after the monitor is turned on. It allows access to all other menus and the freeze function. Whenever you are in another menu, you can always immediately get to the Main Menu simply by pressing the MAIN MENU button. In every menu (except for the Main Menu itself), the MAIN MENU button is the farthest button on the right.

Here is a brief description of what each button does in the Main Menu (the FREEZE button has already been described).

SENSORS—allows selection of all patient parameter menus: CUFF, ECG, invasive pressure (INV PRS), and pulse oximetry (SpO_2). Details of how to use these menus and the patient monitoring functions are described in Chapter 2.

ALARMS—allows control of the alarm system and adjustment of alarm limits. Details of how to use these menus and the alarm functions are described in Chapter 3.

DISPLAY—allows control over aspects of the display, including contrast (LCD version only), the backlight mode (LCD version only), sweep speed, temperature units in °C or °F, trend data, alarm tone volume, and the heart rate source and tone. Details of how to use these menus and the display functions are described in this chapter. However, trend display information is described in Chapter 4.

SYSTEM—allows control over the general set up of the monitor, such as time, programming, and other settings. The SYSTEM button also allows activation of several internal tests. The *Propaq Technical Reference Guide* describes how to use the test features. The Printer Menu (if a printer is installed) is controlled through the System Menu.

More Button

MORE

Except for the Main Menu, all menus have up to four labels and a MAIN MENU label. The MAIN MENU label allows you to quickly display the Main Menu.

Some menus, such as the ECG Menus, have more than four functions; these menus require more than four labels. A MORE button in these menus cause another menu to be displayed with more functions. This second menu may also have a MORE label to display another menu, or to display a previous menu. The MORE label allows moving amongst several menus when more than four functions are available.

Sensors Menus

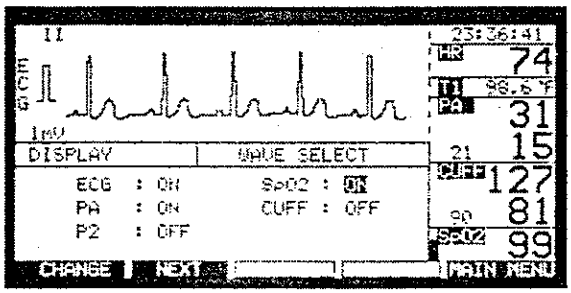
The Sensors Menus allow you to select functions related to each of the Propaq's patient monitoring functions (CUFF, ECG, INV PRS, and SpO_2). Since each Propaq model has different capabilities, only the labels appropriate for each model are displayed. SpO_2 is displayed only if the SpO_2 option is installed. Sensor functions are described in Chapter 2.

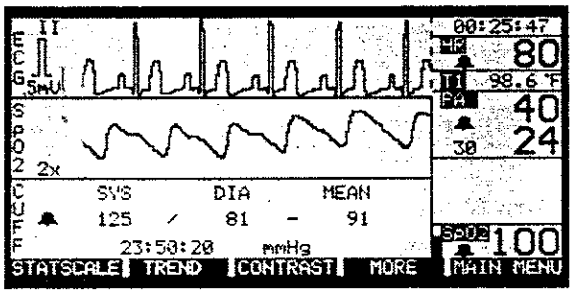
Alarms Menus

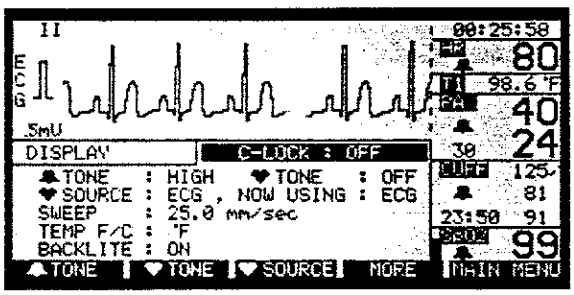
The Alarms Menus allow you to set alarm limits and activate and deactivate alarms. The Propaq alarms functions include immediately and automatically setting all alarm limits and manually setting individual alarm limits. The alarms functions are described in Chapter 3.

Display Menus

The Display Menus allow you to control display contrast (LCD version only), the number of waveforms shown, and other aspects of the display. When the MORE button is pressed, a status window appears showing all current Propaq display settings. Display functions are described on the next few pages.







STATSCALE—quickly selects the best scales for optimum viewing of all waveforms and trends.

APPLICATION HELP
Once you've prepared a patient for monitoring and have made all the necessary connections and zeroed the pressure channels, press STATSCALE to quickly assess the patient's vital signs. All wave forms will be displayed against the most applicable scale for the patient's measurements, giving you an immediate reference. Once you have assessed the patient's conditions, change the scales as necessary.

TREND—displays the Trend Menu described in Chapter 4.

CONTRAST (LCD versions only)—adjusts the brightness of the displayed information. Each press of this button slightly changes the screen brightness. The CONTRAST label is in the same position as the DISPLAY label in the Main Menu. If you set the contrast while viewing the monitor from one position and then change your position, you may have to readjust the contrast.

Bell TONE—Adjusts the volume of the alarm tone to LOW, MED, or HIGH. Earlier versions of the Propaq do not have a medium setting.

♥TONE—adjusts the loudness of the tone that sounds with each detected heart beat. ♥TONE loudness can be set to LOW, MED, HIGH, or OFF. Earlier versions of the Propaq do not have a medium setting.

If SpO_2 is monitored, the heart tone is produced by the speaker in the SpO_2 option. The pitch of the tone varies with the SpO_2 value. See Chapter 2.

If SpO_2 is not monitored, the heart tone is produced by the speaker in the Propaq.

♥SOURCE—selects the heart rate source from ECG, P1, SpO_2 (if installed), or P2. CUFF cannot manually be selected.

mm/sec—changes the speed at which waveforms are updated. Three sweep speeds are available: 12.5, 25, and 50 mm/second. The sweep speed setting affects all waveforms.

TEMP F/C—changes the temperature display units. Temperature can be displayed in °F or °C.

BACKLITE (LCD versions only)—changes the backlight operating mode between ON (always on) and 3 Min. Reset.

The backlight enhances viewing of the Propaq display: when it is on, the display can be seen more clearly. However, the backlight uses battery power. By setting the backlight mode to 3 Min. Reset, power can be conserved, extending the Propaq's battery operating time.

In 3 Min. Reset mode, the backlight turns off within two seconds after selecting 3 Min. Reset. After that, the backlight turns on any time a button is pressed, or when a *patient alarm* occurs. If a button has been pressed, the backlight remains on for three minutes after the last button has been pressed. If a patient alarm occurs, the light remains on for three minutes after the patient alarm has ceased.

***Patient A[illegible]*—an alarm that occurs when a patient's vital signs violates the set limits.**

APPLICATION HELP
Use the 3 Min. Reset mode when using the Propaq on battery for long distance transport, such as international flight or transporting a patient out of wilderness country. You can obtain maximum battery operating time, and yet the Propaq will alert you to any alarm conditions, and will automatically turn on the backlight for clear viewing of the patient's vital signs.

WAVE SEL—displays the Wave Select Menu, allowing you to select the waveforms to be displayed. You can selectively display one, two, or three waveform windows. In addition, the most recent noninvasive blood pressure measurement can be displayed as a waveform window.

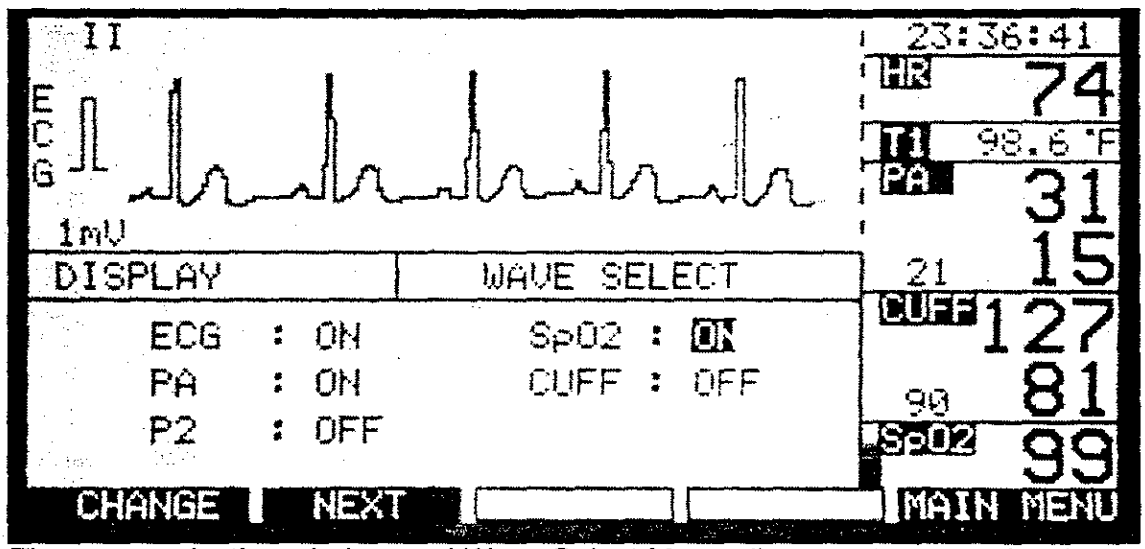
When the Wave Select Menu is displayed, the NEXT button moves the *cursor* from one selection to the next in the status window. The CHANGE button changes the selection to ON or OFF, selecting whether or not the information will be displayed.

Cursor—*the dark block surrounding a text item in a window. When you press a key to select the next item, the cursor moves to the next item.*

NOTE

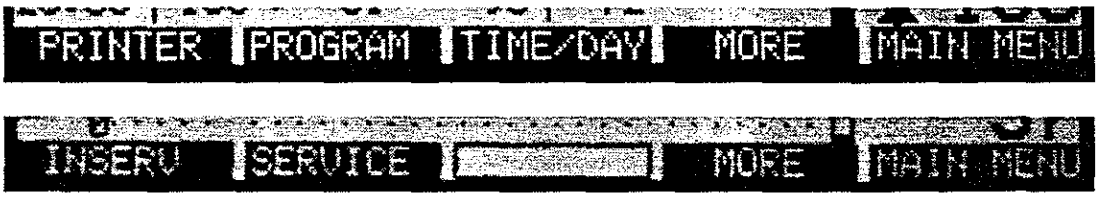
The ECG waveform window is always turned on to ensure you will always be able to see the ECG waveform when ECG is monitored.

If more than three waveform windows are turned on for display, and they all have information to display, only the first three listed that are turned on are shown. For example, if all but CUFF are turned on, only ECG, P1, and P2 will be shown; SpO_2 will not be shown. If a waveform is turned off or is not shown because the display is already full, the waveform will be shown anytime you access its associated menu. In the example just suggested, the SpO_2 waveform will be shown any time you press SpO_2 in the Sensors Menu.



The wave selection window and Wave Select Menu allow you to customize the content of the display. Only the information you know you will need to continuously see can be selected for display, making the display specific for your particular application.

System Menus

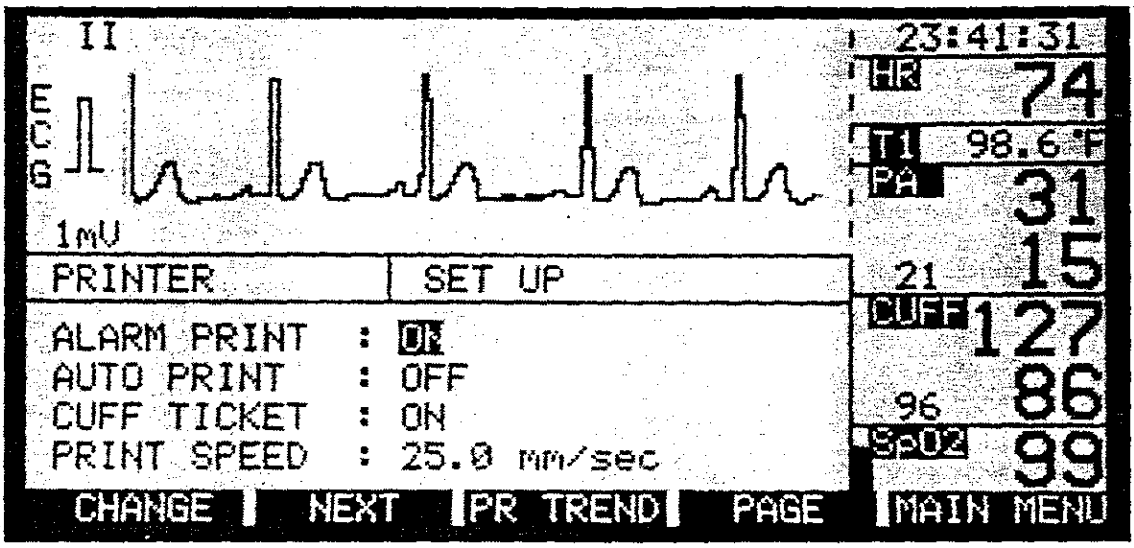


The System Menus provide several system-related Propaq functions. These functions include programming the Propaq's *turn-on settings* (PROGRAM), setting the time and date (TIME/DAY), setting up the printer (PRINTER), activating the In-service mode (INSERV), and allowing servicing procedures (SERVICE).

The PROGRAM and TIME/DAY functions are described later in this chapter under *Preparing Your Propaq for Use*. The PRINTER functions are described on the next few pages. The INSERV function is described later in this chapter under *Practicing With Your Propaq*.

The SERVICE functions are fully described in the ***Propaq Technical Reference Guide*** (see *About This Operator's Guide* at the front of this book for more information about the ***Technical Reference Guide***). These functions are for assisting the biomedical service person in calibrating and checking out the Propaq during and after monitor service.

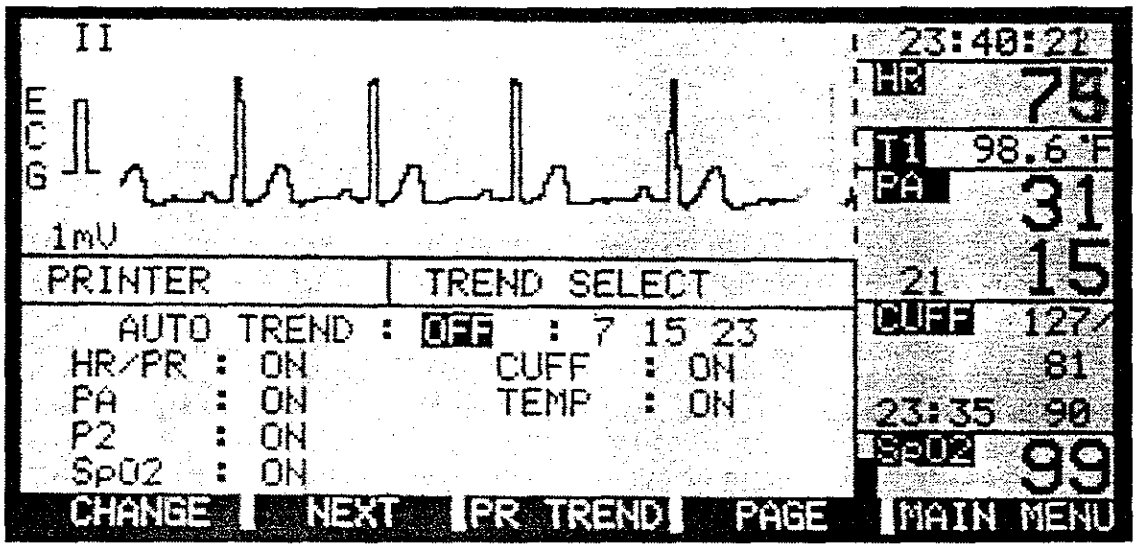
Menus



When you press SYSTEM and then PRINTER, the Printer Menu appears along with the printer status window. You can set the following printer functions by selecting the function in the window using the NEXT button and changing the setting using the CHANGE button:

- Automatically print upon an alarm. The Propaq prints 20 seconds of patient information. The first 12 seconds contains information prior to the occurrence of the alarm. The print speed is automatically set to 25 mm/sec.
- Automatically print 8 seconds of patient information every 15 minutes, 30 minutes, 1 hour, 2 hour, or 4 hours. This is the latest patient information (real time). The print speed is automatically set to 25 mm/sec.
- Automatically print the results of a cuff measurement (CUFF TICKET) when the measurement is taken.
- Set the print speed for real time measurements to 12.5, 25, or 50 mm/sec. This sets the print speed for a printout obtained by pressing the START/STOP button on the printer (described on the next page).

For more information on printing vital signs, see the desired vital sign section in Chapter 2.



When you press the PAGE button, another printer status window appears. This window lets you set how often you want patient trend information printed and which trends you want printed.

When AUTO TREND is turned ON, the Propaq will print trends at eight-hour intervals. The interval times are shown next to the ON/OFF selection: 7 15 23 means the trends will be printed at 7:00, 15:00 and 23:00.

When ON appears next to the trend title, the trend will be printed. Once the selections are made you can print all selected trends by pressing the PR TREND button in the Printer Menu.

You can also print only one trend by using the Trend Menu to display the trend you want printed and then pressing the PRINT button on the Trend Menu. See Chapter 4 for more information about trends.

In addition to the Printer Menu, the front panel of the printer lets you manually start and stop printouts of waveforms and numerics.

- START/STOP—lets you manually start and stop a printout of patient information as it is monitored (real time). You must press the button to start the printout and press it again to stop the printout.
- SNAPSHOT—lets you print the last 8 seconds of patient information. The printer prints the 8 seconds of patient information obtained prior to pressing SNAPSHOT. The last bit of patient information on the printout is the data obtained at the time you pressed SNAPSHOT If you press FREEZE prior to pressing SNAPSHOT, the printer prints the 8 seconds of patient information obtained prior to when you pressed FREEZE.
- PAPER FEED—advances the paper out of the printer.

Simultaneously pressing START/STOP and PAPER FEED prints a test strip. This should be done after you've changed the printer paper and whenever you suspect the quality of the printouts. See Chapter 5 for more information on changing the printer paper.

The three printer buttons let you print patient information on demand.

P. .paring Your Propaq for Use

suring Your Propaq Is Ready

Before using the Propaq on a patient, be sure you have read the *Safety Summary* at the front of this book. It provides important information about safely using the Propaq.

Be sure the Propaq is in top working order. Check to make sure there are no cracks in the case or the display. Make sure the cables you are going to use are not broken, cracked, or fraying. Any problems should be corrected by your biomedical service person or an authorized Protocol Service Center.

Most biomedical service departments have required service intervals for the monitoring equipment in their hospital. If the Propaq has been used longer than the recommended service interval, it should be checked for accuracy and proper functioning before being used on a patient. Never use a monitor that is suspected of being inaccurate or out of calibration. If your biomedical service department does not have a recommended interval, Protocol Systems recommends the Propaq be serviced at regular intervals as described in Chapter 5.

You can run the Propaq on its internal battery, or run it from the ac mains using the Propaq power adapter provided with the monitor. If you are going to run the Propaq on its battery, be sure the battery is fully charged. Keeping the Propaq plugged into its power adapter for about eight hours with the monitor turned off should provide the Propaq with a fully charged battery.

After you've checked out the Propaq, turn it on and let it perform its own startup tests to be sure it functions normally. Once it has completed the startup tests, the monitor is ready for use.

For further operating information about patient monitoring, read Chapter 2. More information about setting up the Propaq is on the following pages.

Setting the Time & Date

The time is shown above the heart rate in twenty-four hour format: 00:00:00 is midnight; 12:00:00 is noon. The time and date appear on printouts created with the Propaq printer in the Expansion Module. You should make sure the time and date are set before using the Propaq for patient monitoring. Here's how you do it.

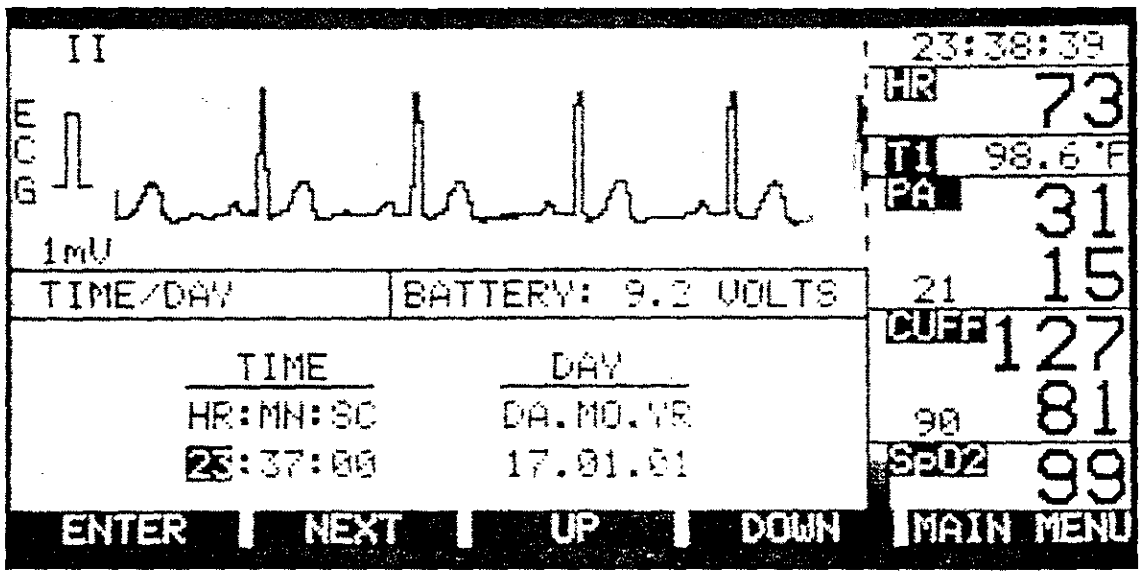
☞ From the Main Menu, press SYSTEM, press MORE, and then press TIME/DAY. The Time/Day Menu and status window appear (shown below) with the cursor positioned for time adjustment. Use the NEXT, UP, and DOWN buttons to adjust the time and day as follows.

☞ Press the NEXT button to select the hours, minutes, seconds, month, day, or year.

☞ Press the UP or DOWN button to increase or decrease the value.

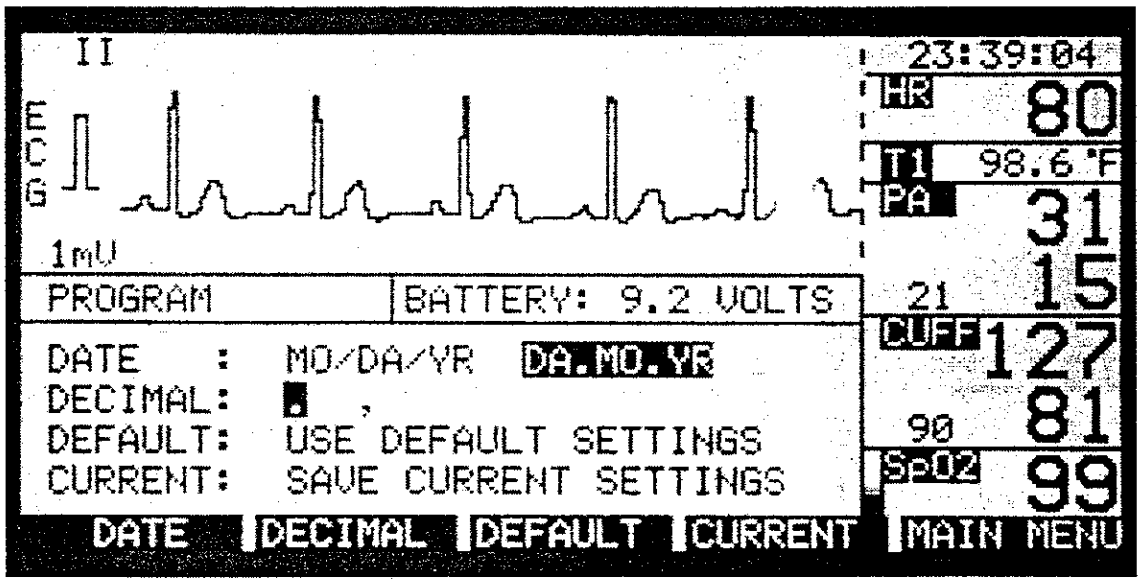
☞ Press the ENTER button after the time and date values are selected to set the time and date.

☞ When you have finished setting the time and date, press the MAIN MENU button to return to the Main Menu.



Setting Time/Day and Decimal Formats

You can select the way the date is shown and select the decimal character as either a period (.) or a comma (,). The settings are shown in the Program window (shown below) and changed using the DATE and DECIMAL buttons. To change the setting, simply press the button to move the cursor from one setting to the other. The change takes affect immediately.



Programming the Propaq's Turn-on Settings

Turn-on settings—*all functions that can be set using the pushbuttons, such as the display contrast, alarm limit values, trend graph scales, and all patient monitoring functions, can be programmed so that these settings will automatically be assumed when the Propaq is turned on.*

At the factory, the Propaq is set up to turn on with the display contrast, alarm limit values, trend graph scales, and monitoring parameters already set. However, your particular workplace may "normally" use other settings. With the Propaq's programming ability, you can program the Propaq's *turn-on settings* for your particular application. The PROGRAM button in the System Menu performs this function.

When the monitor is shipped from the factory, it is programmed with *factory "default" settings*. The factory default settings are listed with the specification listings in Appendix B of this manual. You can always reprogram the Propaq to these factory settings by pressing the DEFAULT button of the Program Menu.

The Propaq will turn on with the factory default settings the first time it is used. To program the Propaq power-up settings for your particular application, use the following steps. It is important that you make sure you have selected all the desired settings before you program the Propaq, or you may end up with the monitor not programmed exactly the way you want.

☞ After you turn on the monitor, press the DISPLAY button in the Main Menu, and press the CONTRAST button (LCD versions only) to set the contrast you desire. Press MAIN MENU to return to the Main Menu.

☞ To set the ECG functions, press SENSORS and then ECG. Using the ECG menus, set all ECG parameters (mm/sec, LEAD, SIZE, ♥TONE, FILTER, and PACER). Press MAIN MENU.

☞ To set the invasive pressure functions, press SENSORS and then INV PRS. Using the Invasive Pressure Menu RANGE button, set the desired invasive pressure range for each channel (Models 104 & 106 only). Press MAIN MENU.

☞ To set the temperature units, press DISPLAY, then MORE, and then MORE again. Press TEMP F/C to set the temperature units to either °C or °F. Press MAIN MENU.

☞ To set the noninvasive pressure functions, press SENSORS and then CUFF. If you want the Propaq to turn on with the noninvasive pres-

sure channel ready to automatically take blood pressure measurements, press AUTO and then INTERVAL in the Cuff Menu until the desired measurement interval is displayed in the cuff status window next to the word TIME. If you don't want the Propaq to automatically take noninvasive blood pressure measurements, press MANUAL. Press MAIN MENU.

☞ To set the SpO_2 functions, press SENSORS and then SpO_2. Using the SpO_2 Menus, set all SpO_2 functions (SIZE, C-LOCK, and RESPONSE). Press MAIN MENU.

☞ To set the alarm limits, press ALARMS. Using the Alarms Menus, set all alarm limit values as you want them to be when you turn on the monitor.

☞ To set the trend graphs, press DISPLAY and then TREND. Use the GRAPH and PARAMETR buttons to select each trend parameter window and display the scale you want to appear the first time you select each trend. Then, press the PARAMETR button to display the trend you want first to appear the first time you press the TREND button. Press MAIN MENU.

☞ To set the alarm tone volume, press DISPLAY and then MORE. Use the Bell Tone button to select the alarm tone volume. Press MAIN MENU.

☞ To set the source from which the heart rate is derived, press DISPLAY and then MORE. Use the ♥SOURCE button to select the desired heart rate source. Press MAIN MENU.

☞ To set the waveform windows you want displayed, press DISPLAY, then MORE, then MORE again, and then WAVE SEL. Use the NEXT and CHANGE buttons to turn on only the waveforms you want to see. Press MAIN MENU.

☞ To set the date and decimal formats, press SYSTEM and then PROGRAM. Use the DATE and DECIMAL buttons to select the desired formats. Press MAIN MENU.

☞ To program the monitor, press the following buttons:

SYSTEM, then PROGRAM, and then CURRENT. Press MAIN MENU to return to the Main Menu.

The Propaq is now programmed to turn on with all the settings you just selected. You can verify this by turning the monitor off and then on again and selecting each item you programmed.

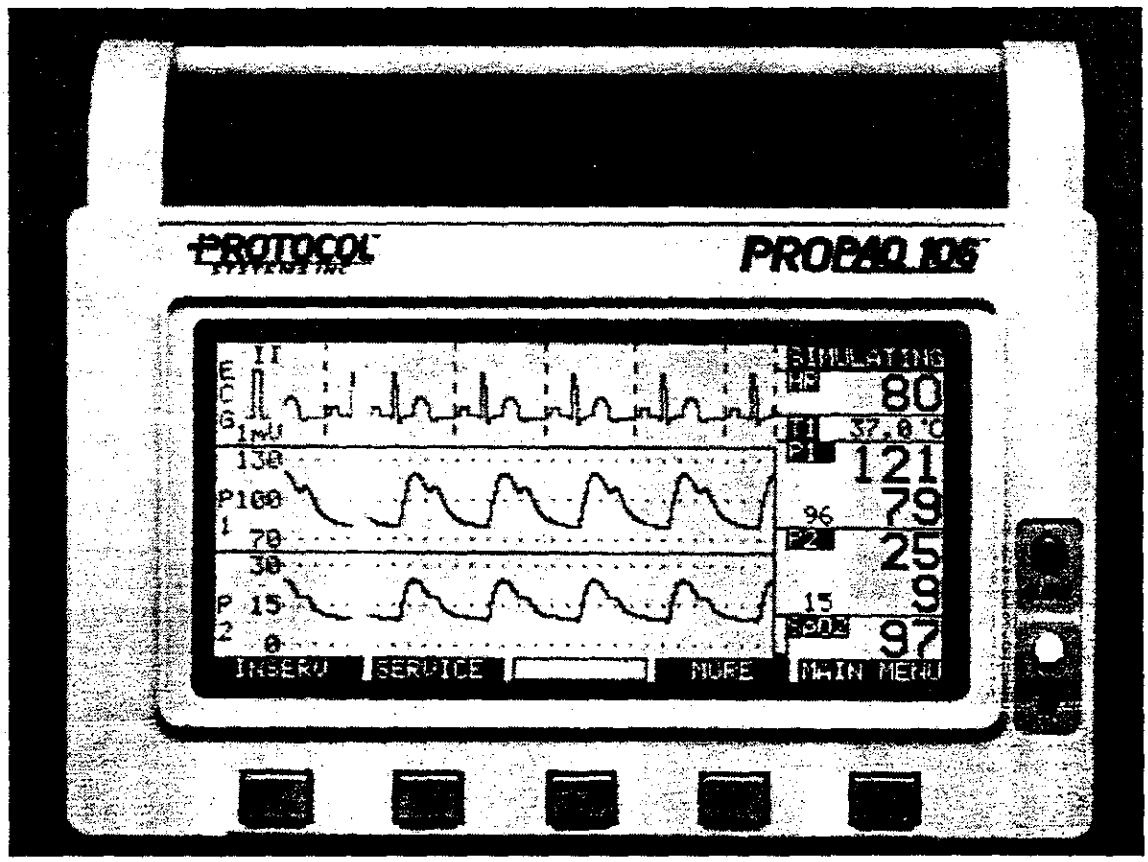
Practicing With Your Propaq (In-service Mode)

One of the most convenient Propaq features for new users is the ability to practice using the Propaq without a patient simulator. You can do this using the Propaq's in-service mode of operation. In-service is activated with the INSERV button located in one of the System Menus.

When you activate in-service mode, the Propaq begins to simulate patient information. The monitor displays an ECG waveform, one or two invasive pressure waveforms with accompanying numeric values (Models 104 and 106 only), and an SpO_2 numeric value. All the information is simulated, and the in-service mode cannot be activated while you are monitoring a patient. While in in-service mode, the message "SIMULATING" alternates with the time of day as shown in the following figure.

NOTE

Simulated data cannot be used to calibrate the monitor.



ng In-service Mode

To begin practicing with your Propaq, you must disconnect all patient cables connected to the monitor. Leave the cuff connected so you can take noninvasive pressure measurements. If you have been monitoring a patient, turn off the Propaq and turn it back on. Then, from the Main Menu, press SYSTEM, then MORE, and then INSERV. Simulated patient information will begin to be displayed.

The Propaq has two sets of simulated patient information—an initial set and an alternate set. To change between them, press the INSERV button. The patient information values used for both sets are listed in the table on the following page.

After activating in-service mode, if you connect a cable or set the cuff channel to automatically take pressure measurements, you are telling the Propaq that you are ready to do actual patient monitoring. The Propaq then stops simulating, goes through its start up tests, and erases any simulated trend data it might have stored. This process is the same as if you turned off the monitor and turned it back on, which you can also do to cancel the in-service mode of operation. Going through this process ensures you never mix simulated data with actual patient information.

Ch ıl	Parameter	Initial Value	Alternate Value
CG	Waveform	Paced, 1mV, Lead II	same as Initial Value
CG	Heart Rate	80 bpm	125 bpm
1	Waveform	Arterial	same as Initial Value
1	Pulse Rate	80 pulses per min.	125 pulses per min.
1	Systolic	121 mmHg	120 mmHg
1	Diastolic	79 mmHg	85 mmHg
1	Mean	96 mmHg	103 mmHg
2	Waveform	Pulmonary Artery	same as Initial Value
2	Pulse Rate	80 pulses per min.	125 pulses per min.
2	Systolic	25 mmHg	25 mmHg
2	Diastolic	9 mmHg	12 mmHg
2	Mean	15 mmHg	18 mmHg
uff	Mode	Manual (Auto cancels in-service)	same as Initial Value
uff	Numerics	Actual values from patient	Actual values from patient
1	Numeric	37.0° C	39.1° C
2	Numeric	36.4° C	37.4° C
T	Numeric	0.6° C	1.7° C
$_{a}O_2$	Waveform	Normal, 2x	Same as Initial Value
$_{a}O_2$	Rate	80 pulses per min.	125 pulses per min.
$_{a}O_2$	Numeric	97%	88%

at You Can Do With In-service Mode

While using the in-service mode, you can press any of the Propaq buttons, *except for the AUTO button in the Cuff Menu*, to change a function setting. You can change the ECG waveform size, turn off and on the pacer indicator, zero pressure inputs, change from °F to °C, set alarm limits, cancel alarms, and change any other functions of the Propaq. (Pressing the ECG LEAD button changes the lead selection indicator, but the waveform does not change.) You can even STAT SET alarms and then change the in-service patient data with the INSERV button to violate the alarm limits.

For noninvasive pressure measurements, keep the Propaq in manual cuff operating mode and take pressure measurements by pressing the START button. You can also press the Cuff Menu's TURBOCUF button to consecutively take pressure measurements for five minutes.

Simulated data can be printed on the Propaq Printer. All printouts include the message "SIMULATED DATA" every four inches to prevent simulated data from being mistaken for actual patient data.

It is possible to reprogram the Propaq to new user settings with the PROGRAM button while using in-service mode. Remember, any time you press the System Menu's PROGRAM button, you reprogram all of the Propaq's turn-on settings.

Use in-service mode freely. You can easily experiment with the in-service function in order to quickly learn the functions of the Propaq.

What You Cannot Do With In-service Mode

You cannot set the Propaq to take automatic noninvasive pressure measurements while using in-service mode. If you press the Cuff Menu's AUTO button, the Propaq will turn off in-service, perform its start up tests, and erase all simulated patient information that was saved in trends.

You cannot activate in-service mode if you have been monitoring a patient. You must first turn off the Propaq, disconnect any patient cables, and then turn it back on. If the Propaq has been used for patient monitoring, it has stored patient information for displaying trends. This information must not be contaminated with simulated data. That's why in-service cannot be activated after you have monitored a patient. Remember, any time a patient cable has been connected to the Propaq, or if the monitor has been set to automatically take noninvasive measurements, the Propaq must first be turned off and then on again to activate in-service mode.